

Onan

**Operator's
and Parts
Manual**

**UF
Generators**

Direct Service

943-0005
5AB73

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then take necessary steps to protect personnel as well as equipment.

WARNING *This symbol is used throughout this manual to warn of possible serious personal injury.*

CAUTION *This symbol refers to possible equipment damage.*

GUARD AGAINST ELECTRIC SHOCK

- Use extreme caution when working with electrical equipment. High voltage currents may cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.
- When working around electrical equipment, move cautiously to avoid shocks.
- Do not lunge after falling tools.
- Do not examine live equipment when mentally or physically fatigued.
- Disconnect electric power before removing protective shields or touching electrical equipment.
- Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Jewelry is a good conductor of electricity and should be removed when working on electrical equipment.
- Do not connect the alternator directly into a utility power receptacle to provide emergency power. It is possible for current to flow from the alternator into the utility line. This creates an extreme hazard for anyone working on lines to restore power.

EXHAUST GASES ARE TOXIC

- Engine exhaust contains CARBON MONOXIDE, a dangerous gas that is potentially lethal. Avoid carbon monoxide inhalation by providing an adequate exhaust system for the driving power source.
- Discharge all engine exhaust gases directly into the open air and away from buildings and enclosures. Check the exhaust system frequently for leaks.

PROTECT AGAINST MOVING PARTS

- Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be worn because of the danger of becoming caught in moving parts.
- Make sure all nuts and bolts are secure. Keep power shields and guards in position.
- If adjustments *must* be made while the unit is running, use extreme caution around moving parts, etc.
- Before servicing alternator always:
 1. Disengage all power.
 2. Shut off engine.
 3. Wait until rotor stops.

FIRE EXTINGUISHERS

- It is a good practice to have a fire extinguisher nearby. Be sure that the extinguisher is properly maintained and be familiar with its proper use.
- Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications (note power must be turned off before electrical fire can be extinguished).

KEEP THE UNIT AND SURROUNDING AREA CLEAN

- Remove oil, grease, ice, snow or materials that create slippery conditions around unit.
- Remove oily rags and other materials that create potential fire hazard.

GENERAL INFORMATION

This instruction book contains information for the proper installation, operation, and maintenance of your equipment. We suggest that this book be kept handy so that it can be referred to when necessary.

This equipment is the result of proven engineering design, highest quality materials, and expert workmanship. Thorough inspection and testing assures you that this equipment will perform as expected.

If you wish to contact your dealer or the factory regarding this equipment, be sure to supply the complete *MODEL* and *SPEC. NO.*, and the full serial number of the equipment as shown on the nameplate. This information is necessary to identify the equipment among the many basic and special optional types manufactured.

TABLE OF CONTENTS

TITLE	PAGE
General Information	1
Description	2
Installation	3
Operation	8
Maintenance	10
Service Diagnosis	13
Parts Catalog	15

DESCRIPTION

GENERAL

This instruction manual applies to the ONAN Direct Current Separate Generators of the specific models listed in the following Table of Ratings.

These generators are designed to supply current directly to the electrical load and can not be used to charge batteries.

The generator construction includes interpoles for sparkless commutation. The generator is drip proof in design, but reasonable precautions should be taken against excessive exposure to moisture.

The generator may be driven in either a clockwise or counterclockwise direction, as necessitated by installation requirements. Whenever the generator rotation is changed, the blower scroll and the field polarity must be reversed and the wires must be connected to agree with the direction of rotation. See paragraphs on (1) *REVERSING THE SCROLL*, (2) *POLARIZING THE GENERATOR FIELD* and (3) *WIRING CONNECTIONS*. The

generator is shipped from the factory with the scroll assembled and the field polarized for counterclockwise rotation. The direction of rotation of the generator is determined while looking at the end of the generator opposite to the drive end.

CAUTION

Refer to the generator nameplate for its recommended driven speed. Be sure that the maximum speed (rpm) will never be exceeded. Select the correct size of driving and driven (generator) pulleys as instructed to assure that the generator will never exceed its maximum rated speed.

The voltage regulated generator (2UF-125/29A), if driven at excessive speed, may generate such high voltage as to burn out the voltage regulator. The regulator is designed to function properly within the operating limits of the generator. If the voltage regulator is likely to be subjected to vibration, such as in crane or shovel application, use suitable shock mountings to isolate the regulator from excessive jolting, etc.

TABLE OF RATINGS

GENERATOR MODEL	RATING AND DATA	†PARTS KEY NO.
2UF-125N/29A	2000 Watts, 125 Volts Direct Current, Shunt Wound, Automatic Voltage Regulated (included), 1200 to 2500 RPM Variable Speed (See Note "■" Wiring Diagram #620A18.	1
5UF-125N/1A 5UF-125N/1B	5000 Watts, 125 Volts Direct Current, Compound Wound, Constant Speed (See nameplate), Rheostat control of voltage is required but is not included, Switchboard including Rheostat and Meters, etc. is available. Wiring Diagram #81786.	2
10.0UF-150S/1A 10UF-150N/1A	10000 Watts, 230 to 250 Volts Direct Current, Shunt Wound, Rheostat is not included but must be incorporated into customers special design control system. Constant speed within range of 2600 to 3000 rpm. Designed for lifting magnet service only. Wiring Diagram #620A37.	3

NOTE "■" - The automatic voltage regulator with rheostat is contained in a separate box and must be connected to the 2UF-125N/29 generator. Voltage regulation is plus or minus 2-1/2%. The rheostat on the control serves to adjust the voltage to the desired value. The automatic voltage regulator then keeps the output voltage at that value, regardless of speed variation between driven speeds of 1200 and 2500 rpm.

NOTE "†" - If a control part does not appear in the list herein, refer to the Wiring Diagram furnished or furnish description and complete nameplate information.

INSTALLATION

LOCATION

Select a site for the generator with the following points in mind:

1. **Ventilation** - The generator creates a considerable amount of heat when operating under load conditions. It is of vital importance that this heat be dissipated by proper ventilation. If the generator is installed in a small room or compartment, provide an opening for entry of fresh, cool air. Provide a separate opening for exhausting the air heated by the generator. Locate the exhaust opening above the inlet opening, for best air circulation. Heated air is discharged from the generator drive shaft end.
2. **Convenience to Driving Power** - Locate the generator after considering the following points:
 - a. Driving unit location.
 - b. Desired direction of shaft rotation.
 - c. Pulley alignment, if used.
 - d. Shaft alignment of generator and driving unit if a flexible coupling is used.
 1. Driving unit location. - Regardless of the type of driving unit it *must* be bolted securely to a heavy mounting base to maintain pulley and shaft alignment.
 2. Desired direction of shaft rotation. - The direction of rotation will be determined by the direction of rotation of the driving unit. The generator direction of rotation is reversible and works equally well in either direction. However, the generator lead wires and blower scroll must be properly installed for whatever direction of rotation is necessary. See *Wiring Diagram* for proper lead connections. See paragraph on *REVERSING THE SCROLL* for proper scroll installation.
 3. Pulley alignment if used. - The shafts of the generator and driving unit must be parallel and the sides of the pulleys must be lined up. Correct belt tension must be permanently maintained. After the pulleys are in proper alignment, both generator and driving unit must be bolted down to a heavy, rigid mounting base.
 4. Shaft alignment. - If a flexible coupling is used, the shaft alignment of the generator and driving unit must be accurately made and permanently maintained. Incorrect shaft alignment will cause excessive wear on both generator and driving unit and unnecessary loss of power from the driving unit.
 3. **Dusty or Damp Conditions** - Avoid excessive dusty or damp conditions as much as possible. Rust and dirt are enemies of any piece of machinery. The generator is drip proof in design, but unnecessary exposure to moisture should be avoided. The generator should be mounted under cover or inside a building to protect it against the weather.

4. **Servicing Convenience** - To permit easy access for servicing the bearings and brushes, allow at least 24 inches of space around the generator.
5. **Wiring Convenience** - Locate the generator as near as possible to the electrical equipment it is to serve.

GENERATOR COOLING

The generator blower system uses a reversible scroll. When the blower scroll is installed properly, a strong flow of air comes out of the generator at the generator drive shaft end. Lack of air flow indicates improper installation of the blower scroll. See paragraph on "*Reversing the Scroll*".

MOUNTING THE GENERATOR

The generator should be mounted securely to a substantial base of concrete, steel or timber construction.

The mounting surface must be flat so that the generator mounting base will not be sprung, when tightened into place. It should be possible to turn the generator shaft by hand after the generator is bolted down.

Refer to the dimensional outline. Four holes, 5/8" diameter, centered 8-1/4 inches by 10 inches apart serve to mount the generator to a stationary base or to the optional ONAN sliding type base. By a single screw adjustment the sliding base will adjust belt tension by moving the generator ahead or back and the 5/8" mounting holes on it are spaced 12-1/2" x 13-1/4" between centers.

WIRING CONNECTIONS

The generator external leads are not connected, and their manner of connection will depend upon the *direction of rotation*. Refer to the *Wiring Diagram*.

The leads are marked as shown on the wiring diagram. The rheostat must be connected as shown, depending upon direction of rotation of the generator. Examine the rheostat carefully before connecting it into the generator circuit. The rheostat resistance wire may be composed of two different size wires, spliced near the center of the entire winding. If the rheostat is of this type, one generator lead must be connected to the center rheostat post, and the remaining generator lead to the post on the heavier side of the rheostat. Never connect to the lighter side of the rheostat.

Observe specifications of local and national electrical codes for connecting to the electrical load. Use wire sufficiently large to avoid excessive voltage drop between the generator and the load.

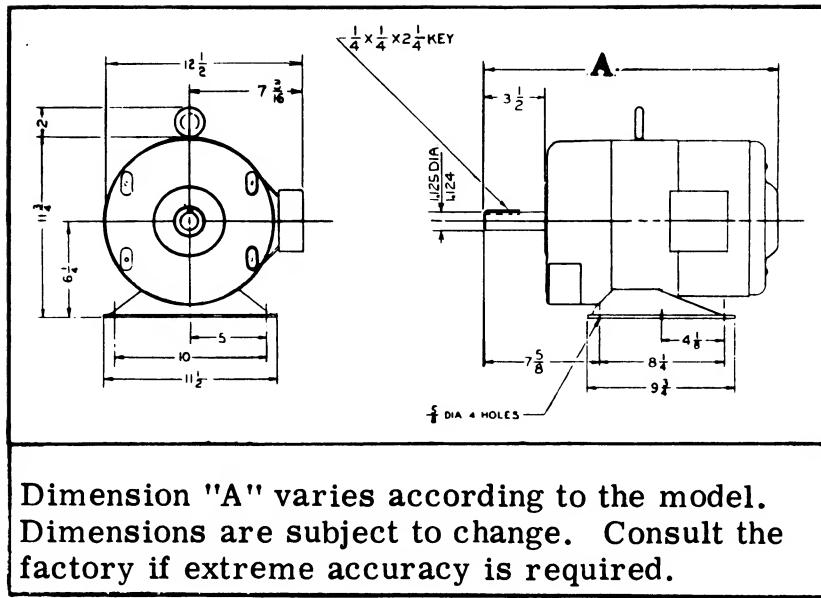


FIGURE 1. DIMENSIONAL OUTLINE

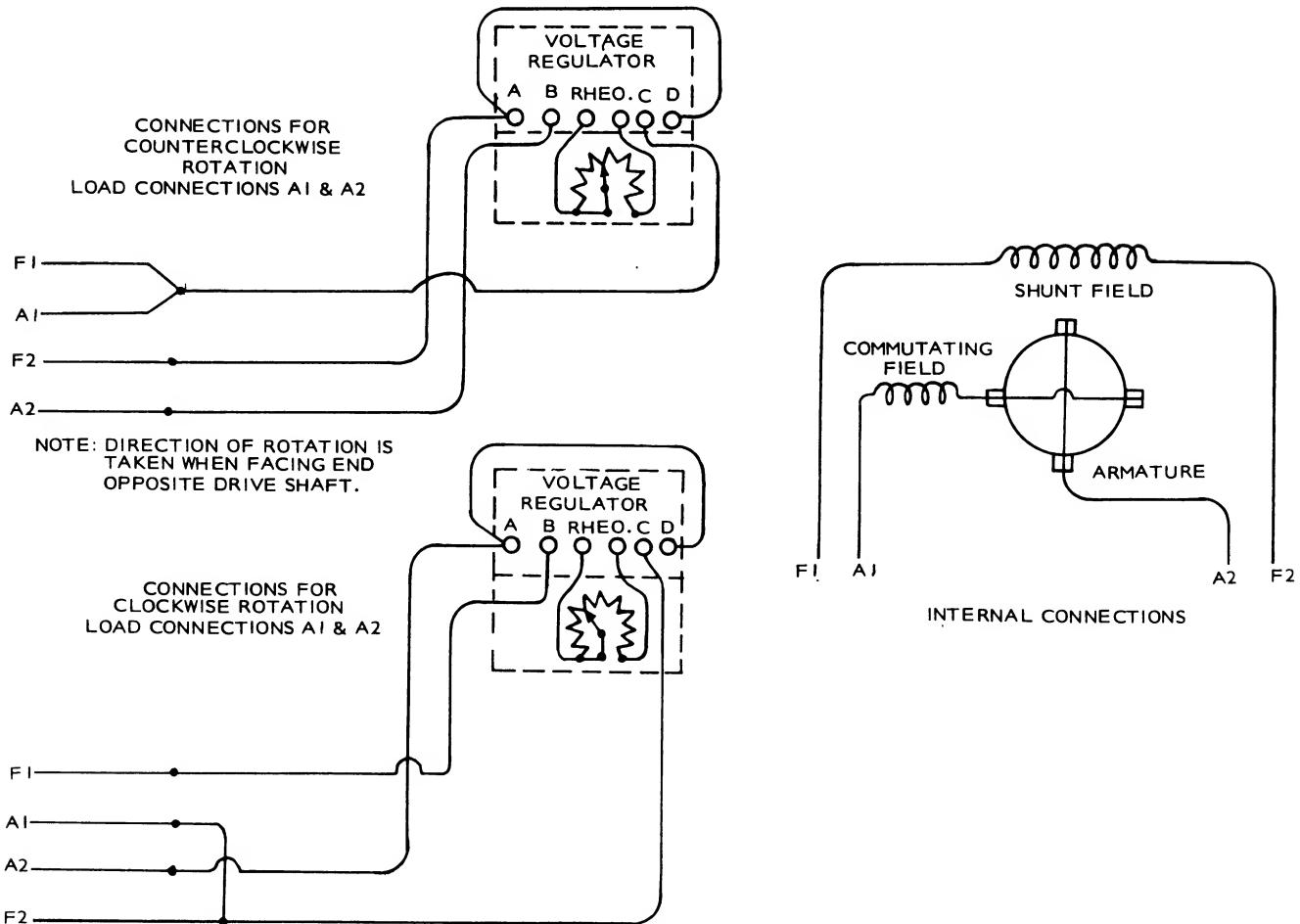
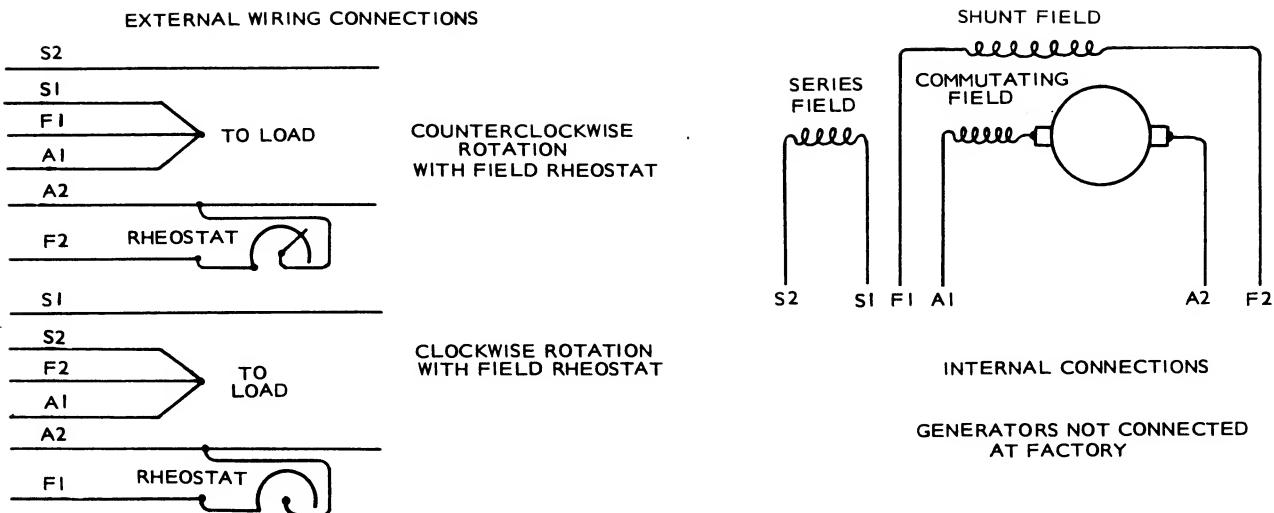
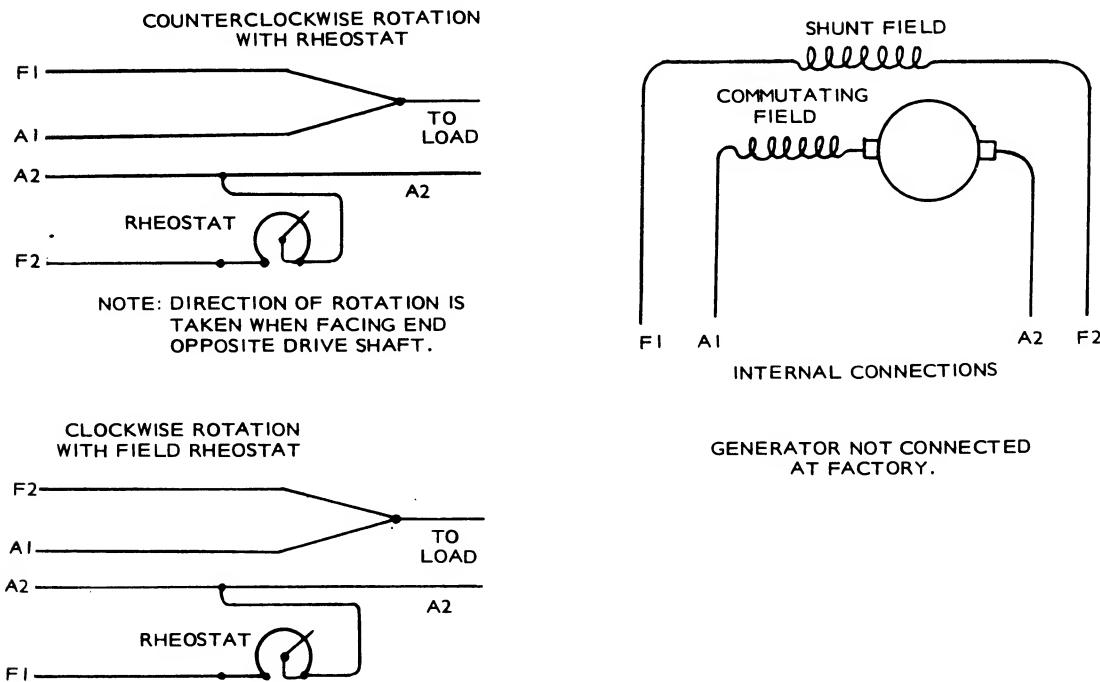


FIGURE 2. VOLTAGE REGULATED GENERATOR WIRING DIAGRAM
NO. 620A18 (For 2UF-125N/29)



NOTE: DIRECTION OF ROTATION IS
TAKEN WHEN FACING END
OPPOSITE DRIVE SHAFT.

**FIGURE 3. COMPOUND WOUND DC GENERATOR WIRING DIAGRAM
NO. 81786 (For Model 5UF-125N)**



**FIGURE 4. SHUNT WOUND DC GENERATOR WIRING DIAGRAM
NO. 620A37 (For Model 10.0UF-150S & 10UF-150N)**

DRIVING UNIT

The proper size and type of driving unit for the generator is important for satisfactory operation of the generator. When a gasoline or diesel engine is used the following factors should be considered:

1. Engine Power. - The engine must have a minimum of 2 horsepower for each 1000 watts of generator output. For example, if a 5,000 watt generator is to be operated, the engine must deliver at least 10 horsepower at the drive shaft. If the engine has a considerable reserve of power the speed regulation and voltage regulation will be much better.
2. Engine Pulley Speed. - The engine may have a variable speed governor which regulates engine speed at about 8-1/2 to 12%. If so, governor operation is best at the maximum rated speed of the engine. When the generator is operating at or near its capacity, the tendency of the engine is to increase speed when the load is suddenly removed. The engine governor does not react fast enough at low speed to prevent momentary acceleration and high voltage. This may possibly cause serious damage to any electrical equipment left connected. Governor action is much better when the engine is operating at its rated speed, and the engine cannot increase its speed too much when the load is removed. If the engine has a constant speed governor, the speed regulation is 5% or less and the above effects are not present. Low generator speed causes low voltage.
3. Pulley Selection. - The rated speed of the engine (or electric motor) driving the generator will determine the size of pulley to use on the generator. Drive the generator as near as practicable to the rated generator speed, then adjust the rheostat to attain the desired voltage. To determine the correct generator pulley size to use, proceed as follows:
 - a. Multiply the *diameter* of the driving unit pulley by its *speed* in rpm (revolutions per minute).
 - b. Divide the above result by the nameplate speed on the generator.

EXAMPLE: A driving pulley 15 inches in diameter operates at 1200 rpm. Multiply 15×1200 getting a result of 18,000. Divide the 18,000 by 1750 rpm (generator pulley speed desired) and the final result is 10 (nominal), which expresses the size of the pulley (in inches) required.

REVERSING THE SCROLL

The generator is shipped from the factory with the blower scroll mounted for counterclockwise rotation. The direction of rotation is determined while looking at the end opposite the drive end. If a clockwise direction of rotation is desired, the blower scroll position must be reversed. The arrow which is printed on the scroll must be pointing in the direction of the rotation of the generator shaft. See illustration, *Blower Scroll*.

To reverse the scroll, remove only the scroll with screen attached, turn it end for end and reinstall it so that the scroll will be at the opposite end of the air outlet hole, as illustrated.

POLARIZING THE GENERATOR

To reverse the scroll, remove only the scroll with screen attached, turn it end for end and reinstall it so that the scroll will be at the opposite end of the air outlet hole, as illustrated.

POLARIZING THE GENERATOR FIELD

When the generator is received the generator field is correctly polarized for counterclockwise direction. After the generator field is once polarized it does not have to be polarized again unless the direction of rotation of the generator is changed. The procedure for polarizing the generator field is different for each direction of rotation of the generator. Follow the instructions for polarizing the generator field for whatever direction of rotation of the generator is to be used. The use of a good battery in fully charged condition (or a higher DC voltage source) is required. Have the generator field leads (F1, F2) dis-

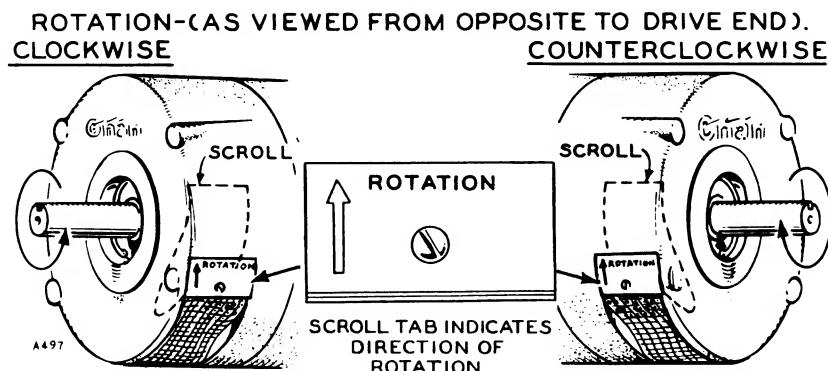


FIGURE 5. BLOWER SCROLL

connected from the control (rheostat or regulator where used).

1. Polarizing the Generator Field for Clockwise Rotation (use a 24-volt battery when polarizing the generator, check battery for full 24-volt output):
 - a. Connect the generator F2 lead to the battery positive (B+) terminal.
 - b. Connect the generator F1 lead to the battery negative (B-) terminal. Be sure good contact is made. A definite spark should be observed where this is done. If no spark is seen check for bad battery or open circuit between F1 and F2.
 - c. Connect the generator as shown in the *Generator Wiring Diagram* and check the polarity of the A1 lead with a DC voltmeter. The polarity of the A1 lead must always be positive. With the generator running the meter should read in the right direction when the positive terminal of the meter is connected to A1 and the negative terminal of the meter is connected to A2. If the voltmeter does not read in the right direction, check all connections and repeat the polarizing procedure until it does. A weak spark or a reverse reading indicates a higher DC voltage source is needed to kill the existing residual magnetism. (NOTE: If an ONAN Switchboard Control is being used with model 5UF-125N, connect the generator as shown on the *Wiring Diagram* for that control.)

2. Polarizing the Generator Field for Counterclockwise Rotation:

- a. (NOTE: This procedure is required only if a return to counterclockwise rotation is desired.) Connect the generator F1 lead to the battery positive (B+) terminal.
- b. Connect the generator F2 lead to the battery negative (B-) terminal. Be sure good contact is made. A definite spark should be observed where this is done. If no spark is seen check for bad battery or open circuit between F1 and F2.
- c. Connect the generator as shown in the *Generator Wiring Diagram* for counterclockwise rotation and check the polarity of the A1 lead with a DC voltmeter. The polarity of the A1 lead must always be positive. With the generator running the meter should read in the right direction when the positive terminal of the meter is connected to A1 and the negative terminal of the meter is connected to A2. If the voltmeter does not read in the right direction, check all connections and repeat the polarizing procedure until it does. A weak spark or a reverse reading indicates a higher DC voltage source is needed to kill the existing residual magnetism. (NOTE: If an ONAN Switchboard Control is being used with model 5UF-125N, connect the generator as shown on the *Wiring Diagram* for that control).

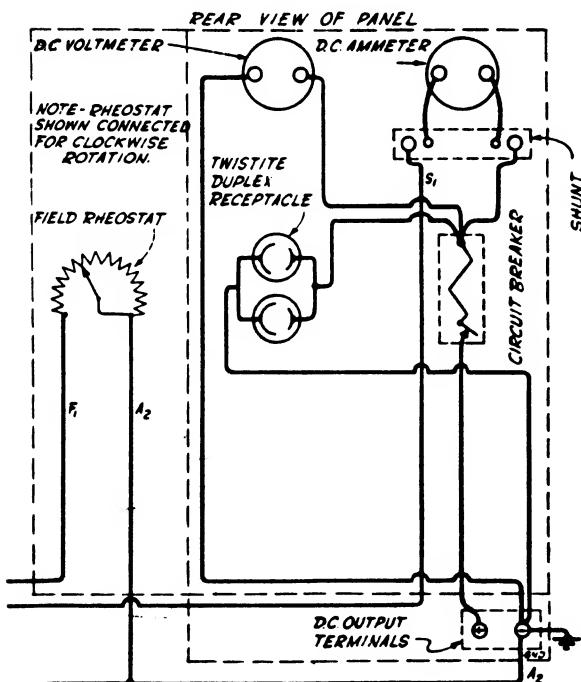


FIGURE 6. SWITCHBOARD CONTROL WIRING DIAGRAM
(For Model 5UF-125N)

ONAN SWITCHBOARD CONTROLS (For Model 5UF-125N)

Specially designed ONAN Switchboard control Model No. 5S-125/A is available for generator Model 5UF-125N. This control includes voltmeter, ammeter, outlet receptacle, circuit breaker, and output terminals. See the illustration *Switchboard Control Wiring Diagram*, for making connections.

OPERATION

GENERAL

Separate operating instructions are given for each model listed in the *TABLE OF RATINGS*. Select the following instructions which apply to the model in question.

See that the generator is always kept in alignment with the driving mechanism. If a belt drive is used, see that belt tension is correct. A belt which is too tight will wear rapidly and cause excessive bearing wear on both generator and driving machine. A belt which is too loose will slip, wear rapidly, and cause low generator output.

Check the generator cooling air circulation. When the blower scroll is installed properly, a strong current of air comes out of the drive shaft end of the generator. See the paragraph on *Reversing the Scroll* for proper installation of the blower scroll.

The generator must be driven in the direction for which it was connected and polarized, as previously explained.

INITIAL START (Model 2UF-125N/29)

Be sure the generator is connected for the direction of rotation being used. On the initial start, run the generator with no load connected and adjust the regulator rheostat to obtain the desired rated voltage. Check the voltage under load operation.

GENERATOR OPERATION (Model 2UF-125N/29)

As explained in the *TABLE OF RATINGS*, the automatic voltage regulator keeps the output voltage within 2-1/2 percent of the voltage selected by the adjustment of the rheostat, regardless of speed variation between driven speeds of 1200 and 2500 rpm.

The adjustable resistor on the voltage regulator base is set at the factory so that the rated voltage is obtained when the regulator rheostat is set in approximately the middle of its range or travel. Check abnormal speed or load conditions before attempting to readjust the resistor.

INITIAL START (Model 5UF-125N)

Be sure the generator is connected for the direction of rotation being used. On the initial start, reduce the generator voltage by turning the manual field rheostat to the maximum counterclockwise position. Then, run the generator at no load and rated speed (see nameplate). Adjust the manual field rheostat to obtain a generator output of approximately 132 volts for a 125-volt rated generator with no load connected. This results in a desireable voltage under full load operation.

GENERATOR OPERATION (Model 5UF-125N)

Connect the various electrical loads after the generator voltage is adjusted to the proper value at no load. The voltage can be controlled by the manual field rheostat or by changing the generator speed slightly. This may be

necessary when large changes in the electrical load are made. The rheostat is used to compensate for slight variations from the nameplate speed. If the speed of the generator is held to within 100 rpm of that shown on the nameplate, the output differential between no load and full load conditions will be satisfactory.

Keep the electrical load on the generator within its nameplate rating. Overloading the generator will cause the voltage to be low.

SWITCHBOARD OPERATION (For model 5UF-125N)

When the generator installation includes a Switchboard Control, generator operation can be checked by means of the voltmeter and ammeter. See the illustration, *Switchboard Control Wiring Diagram*. The circuit breaker is designed to automatically disconnect the load when the generator becomes excessively overloaded.

The Duplex receptacle is included so that small loads (not to exceed 15 amperes per receptacle) can be conveniently connected at the Switchboard. Loads connected at the receptacle do not pass through the circuit breaker but they are recorded on the ammeter. The generator current as read on the ammeter must not exceed the generator nameplate rating.

INITIAL START (Model 10.0UF-150S & 10UF-150N)

Be sure that the generator is connected for the direction of rotation being used. Set the rheostat at maximum resistance (minimum voltage) position. Start up the generator and drive it at nameplate rated speed. Connect a full load to the generator and adjust the rheostat to obtain 250 volts generator output as shown on the DC voltmeter.

GENERATOR OPERATION (Model 10.0UF-150S & 10UF-150N)

Use these operating instructions only in the absence of any instructions furnished with the special control system used with the generator.

If it is known that a higher voltage when starting will not damage the load to be connected, the rheostat will not require adjusting between successive operations.

To assure protection of the load, begin each start with the manual field rheostat in the maximum resistance (minimum voltage) position. Start the generator and adjust the generator voltage by means of the manual field rheostat to 250 volts or to the rated voltage of the magnet. Connect the magnet to the generator by operating the magnet controller. After the magnet is connected to the generator, the voltage should again be adjusted to 250 volts or to the rated voltage of the magnet. As the magnet warms up its resistance increases until it reaches normal

operating temperature. The voltage of the generator should be readjusted to the proper value when the magnet reaches normal operating temperature.

Keep the electrical load on the generator within its nameplate rating. Overloading the generator will cause the voltage to be low and overheat the generator. The

generator is rated for "50% DUTY CYCLE - not over 30 minutes per full load run". Fifty percent duty cycle means that if for example, the lifting magnet is "turned on" for approximately five minutes, then it should be "turned off" for approximately five minutes (or as conditions require to prevent overheating of the generator).

MAINTENANCE

GENERAL SERVICING

The generator is designed to give long and satisfactory service when properly cared for. Regular servicing as outlined here will be well worth the effort required.

The ball bearings are the double-sealed pre-lubricated type and do not require future lubrication.

To lift brushes away from contact, on generators having constant pressure type brush springs, remove all springs and brushes from their holders, as illustrated. On other generators lift each brush into its holder until the spring rests against its side and holds it in place.

MONTHLY SERVICE

Each 200 hours of operation, or once a month, clean the commutator with a dry, lint free cloth. Do not attempt to maintain a bright, newly machined appearance. A dark, glossy appearance is normal. Heavy deposits or slight roughness may be remedied by careful sanding with #00 sandpaper. Hold the sandpaper flat against the commutator, while the generator is operating. Use a flat wooden stick, with light pressure, to hold the sandpaper. Never use emery or carborundum cloth or paper. Wipe or blow out accumulations of brush dust, which may cause a short circuit.

It is not necessary to remove the brush rig or end bell when installing new brushes or cleaning the commutator. The brushes and commutator are easily reached by removing the band from the end bell. If the brush rig position is disturbed for any reason, be sure it is returned to its original setting. This position is important to proper generator performance, and it is identified by a painted or chisel mark on the outer edge of the ring, at a painted edge of one of the supports for the brush rig, inside the end bell.

Brushes should be replaced with new ones when worn to 5/8 inch in length. See that new brushes are free in the guides, and make sure lead terminals are well tightened. It is best to replace brushes, in complete sets, rather than one at a time. Always be sure to use the correct brush, by part number. Do not use a substitute brush which may look the same, and be of the correct size, but may have unsuitable electrical characteristics. New brushes are shaped to fit, and seldom need sanding. The use of the wrong kind of brushes may cause heavy arcing of the commutator and excessive wear on the commutator or may cause both of these effects.

The surface of the commutator may become worn down level with the mica insulation between the bars. If the commutator is worn smooth, the mica between the bars may be cut down to 1/32" below the surface without removing the armature. To undercut mica remove only the end bell. Carefully tag or otherwise mark all leads disconnected.

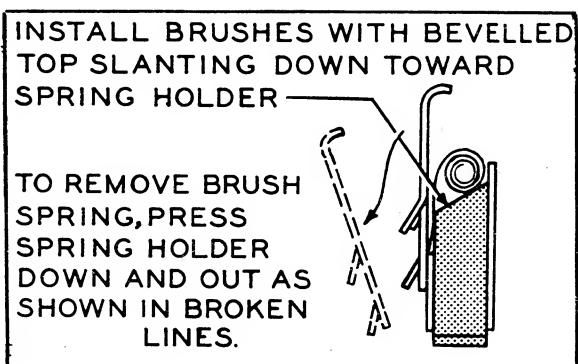


FIGURE 7. BRUSHES AND SPRINGS
(Constant Pressure Type)

Lift each brush away from contact. Pull the end bell off carefully. An undercutting tool may be fashioned from a hack saw blade by grinding blade teeth to a thickness equal to the mica between the bars of the commutator. Use care not to scratch the surface of any bar while undercutting the mica. Remove any burrs formed along the edges of the bars.

If, due to unfavorable operating conditions, the commutator becomes worn out of round, grooved, or pitted it will be necessary to remove the rotor assembly and turn the commutator smooth in a lathe.

After turning down the commutator, undercut the mica between bars as previously described.

MAJOR GENERATOR REPAIR

Consult a competent mechanic or electrician, familiar with DC generators, to locate any faulty windings and to perform any necessary major repair. Several tests for open or grounded circuits can be made without disassembling the generator. Before making tests, and before disassembling the generator, lift the brushes away from contact with the commutator. After completing the maintenance, return the brushes to their operating position.

DISASSEMBLY

If it should become necessary to disassemble the generator, lift all brushes from contact with the commutator. Tag all leads which are disconnected, to insure correct replacement when the generator is reassembled.

When reassembling be sure the bearing stop clip is in place on the bearing opposite the drive end. Avoid possible damage to parts through careless disassembly and reassembly. Most other assembly procedures are self-evident.

ARMATURE GROUNDED

See that all brushes are lifted high in their holders. Use a continuity type test lamp set. Place one test prod on the

commutator, and the other prod on a bare clean part of the generator frame or armature shaft. The prods must make good electrical contact. The test set lamp should not light. If it does light up, the armature is grounded. If the armature tests grounded, replace with a new one.

TESTING THE ARMATURE FOR AN OPEN CIRCUIT

To test the direct current winding of an armature for an open circuit, the use of an armature growler is necessary. Most electrical repair shops have such equipment. It will be necessary to remove the armature for testing. Proceed as follows:

1. Place the armature in the growler which is connected to alternating current. Rub a smooth steel blade (back edge of a hacksaw blade) across the segments of the commutator. See the illustration, *Armature Open Circuit Test*.
2. At some point around the commutator a spark should occur as the blade contacts the two adjacent segments. If a spark occurs, the circuit is complete (not open) between those two segments. Then it will be necessary to rotate the armature just enough to test the next two segments.

Continue the rotating and testing until the commutator segments have been tested completely around. A good spark should occur between all adjacent segments when those segments and windings attached to them are in the correct position in the growler magnetic field. If no spark occurs, the winding between those two segments is open circuited. (There is a possibility that a short circuit of a winding might prevent the sparking, but then the armature would also be magnetized as described in the following paragraph.)

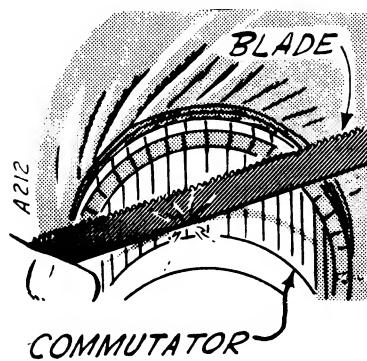


FIGURE 8. ARMATURE OPEN CIRCUIT TEST

TESTING THE ARMATURE FOR SHORT CIRCUITS

Place the armature in the growler (see figure) which is connected to alternating current. Hold a steel knife blade (or hacksaw blade) $1/4$ inch from the armature laminations. See the illustration, *Short Circuit Test*. If the steel blade is attracted to any magnetized armature laminations, either the armature windings or commutator

is short circuited. Do not test for magnetism at just one point of the armature laminations, but test all of the armature laminations from one side over to the other side (along the dotted line on figure). After testing the armature in one position, revolve the armature about $1/8$ revolution and test for magnetism again. Continue the revolving and testing until the armature has been tested completely around.

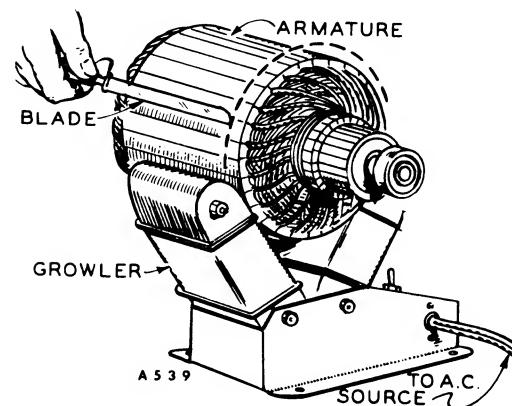


FIGURE 9. SHORT CIRCUIT TEST

FIELD WINDINGS, OPEN CIRCUIT

A test lamp set can be used to test field windings for an open circuit. Place one test prod on one of the terminal ends of the field windings, and the other test prod on the other terminal end of the winding. The test lamp should light. If it does not, an open circuit is indicated. Check carefully to see that the open circuit due to a broken lead or loose terminal is easily repaired. An open circuit within a coil requires replacement of the set of coils.

BRUSH RIG POSITION

The position of the brush rig assembly in the generator end bell is very important. The correct setting of the brush rig was determined at the factory and is identified by a painted or chisel mark on the outer edge of the brush rig and must align with the edge of the end bell where the brush rig is mounted.

As long as the original brush rig and armature are continued in service, these alignment marks must be observed.

BELT ADJUSTMENT, BELT DRIVE UNITS

Proper belt tension must be maintained at all times. Too much belt tension will cause an extra load on the driving unit and rapid wear of the belts and generator bearings. Belts which are too loose will slip, wear out rapidly, and cause the generator to run at a lower speed. Reduced generator speed causes lower output voltage.

To test the V type belt tension, press down on the belt at a point midway between the driving unit and generator pulleys, with the unit not in operation. It should be possible to press the belt down a certain amount depending upon the distance between the belts. When more than one belt is used, each belt should show the same tension. When necessary to replace a worn belt, all belts should be replaced at the same time. A new belt will stretch slightly when first put into operation. Tension should be frequently checked during the first week or two of operation. After this period, little further adjustment should be required.

Driving unit and generator pulleys must be in alignment. To test alignment, place a straight edge tool against the side of the outer driving unit pulley. As a straight edge contacts both sides of the driving unit pulley, it should also contact both sides of the generator pulley. Complete contact of both pulleys should be made at the same time. It may be necessary to loosen the mounting bolts of either the driving unit or generator and slightly turn the loosened unit for proper alignment. Be sure to retighten the mounting bolts.

ALIGNMENT, COUPLING DRIVE UNITS

Coupling (direct) drive units have the driving unit and generator shafts in line with each other. If either the driving unit or generator is loosened from the base, the loosened unit must be properly realigned when reinstalled. Misalignment will cause vibration and excessive strain on the coupling and bearings. Generator shaft maximum runout is .002 inch.

CONTROL TROUBLESHOOTING (For Model 2UF-125/29)

No maintenance is required on the Regohm voltage regulator. The cover should always be kept on the regulator. The component parts of the regulator base assembly should be kept free of dust, grease and moisture.

If a hunting condition (alternate increase and decrease in voltage) exists when using an engine as prime mover, first check for too sensitive adjustment of the engine governor (not enough speed drop from no load to full load condition). Also check for too lean fuel mixture due to incorrect carburetor adjustment. If the hunting condition cannot be eliminated by adjusting the governor and carburetor, then the voltage regulator dashpot screw must be adjusted slightly (see illustration). *NEVER ATTEMPT TO ADJUST ANY OTHER PART OF THE REGULATOR PLUG-IN UNIT.*

Be sure the generator brush rig is in neutral position (witness marks aligned for least arcing and highest voltage) before moving the adjustable resistor sliding clip in order to attain the desired voltage when the rheostat is set at approximately the middle of its travel. Check the voltage output when operating the rheostat to see that the range of adjustment is satisfactory.

If faulty operation occurs, the circuit of the generator and load should be checked first. If the cause of the faulty operation can be definitely traced to the voltage regulator, return it for inspection to the factory or to an ONAN Authorized Service Station. Return the entire base assembly, consisting of the resistors, plus the regulator plug-in-unit; remove wires connected to the terminals marked A, B, RHEO, C and D.

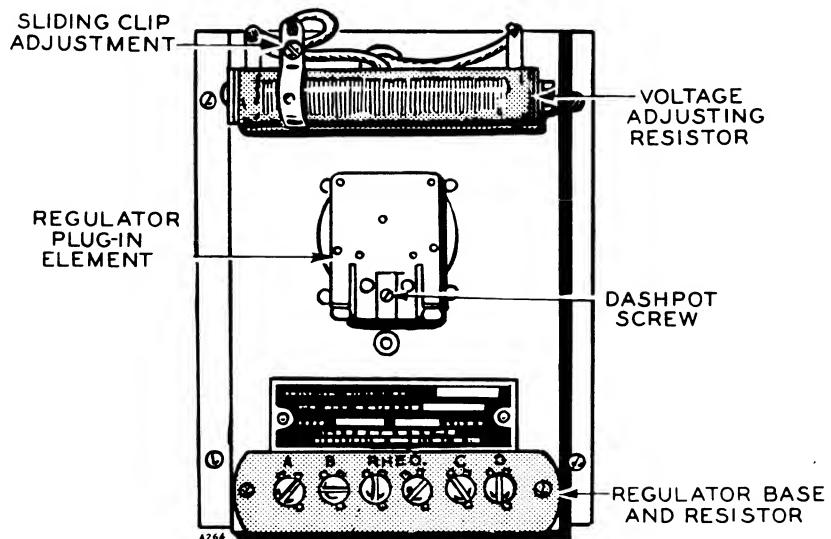


FIGURE 10. REGOHM VOLTAGE REGULATOR ADJUSTMENT

SERVICE DIAGNOSIS

Following is a list of troubles that may be experienced in the operation of the generator. Also listed are the possible causes and usual remedies for getting the generator back into proper efficient operation.

POSSIBLE CAUSE	REMEDY
POOR COMMUTATION OR ARCING AT THE GENERATOR BRUSHES	
Brushes out of neutral position.	Turn brush ring until the identifying marks are aligned.
Brushes not seating properly.	Sand the brush to the proper contour.
Generator heavily overloaded.	If the DC amperage is more than stated on the generator nameplate, remove part of the load.
Brushes binding in holder.	Clean each brush and holder.
Brush tension insufficient.	Replace brush springs.
Brushes worn too short.	Replace brush springs.
Brush tension unequal.	Replace weak brush springs.
Wrong type brush.	Replace with correct type and make of brush and spring.
Loose commutator bars.	Replace with new armature.
High mica.	Undercut the mica.
Commutator out of round.	True the commutator in a lathe.
Commutator surface dirty or oily.	Clean the commutator.

OVERHEATING OF GENERATOR

Windings and parts covered with dirt and oil.	Clean generator.
Overloaded.	Check load or output of generator.
Short circuit or grounded circuit in the field winding or armature winding.	Replace defective parts.
Excessive arcing at the brushes.	See "Poor Commutation" above.
Unequal air gap between pole shoe and armature.	Shim up pole shoe until air gaps are equal.
Generator blower scroll installed in wrong position.	Reverse blower scroll position.

SERVICE DIAGNOSIS
(Continued)

POSSIBLE CAUSE	REMEDY
GENERATOR NOISY	
Generator loose on base.	Tighten mounting bolts.
Worn or defective bearing.	Replace worn parts. Check alignment.
Field pole rubbing armature.	Tighten field poles to frame.
GENERATOR RUNS BUT DOES NOT PRODUCE CURRENT	
Brushes not contacting commutator.	Free brushes in holders. Assemble brushes and springs correctly.
Open, short or grounded circuit in generator.	Test windings and repair or replace defective parts.
Generator line leads broken or loose.	Tighten connections and replace broken leads.
Generator armature rotating in the wrong direction.	<ol style="list-style-type: none"> 1. Correct direction of rotation. 2. Or, connect wires, polarize field and re-install scroll to agree with direction of rotation.
LOW VOLTAGE OUTPUT OF GENERATOR	
Speed low because of loose, slipping belts.	Adjust belt tension.
Generator brushes not in neutral position.	Turn brush ring until the identifying marks are aligned correctly.
External short circuit on line.	Test generator with line wires disconnected.
Open circuit of shunt field winding.	Make proper connections according to wiring diagram.
Short circuit of windings in the field or armature.	Repalace defective part.
Manual field rheostat (if used) adjusted at minimum voltage.	Adjust manual rheostat.

PARTS CATALOG

FOR PARTS OR SERVICE, CONTACT THE DEALER FROM WHOM YOU PURCHASED THE EQUIPMENT OR REFER TO YOUR NEAREST AUTHORIZED SERVICE STATION.

TO AVOID ERRORS OR DELAY IN FILLING YOUR ORDER, PLEASE FURNISH ALL INFORMATION REQUESTED.

REFER TO THE NAMEPLATE

1. Always give the *Model No.* and *Serial No.*
2. Refer to the "Table of Ratings" near the front of this book to determine the "Parts Key No.", which agrees with your model, for selecting the correct part from the list. If your Model and Spec. No. is not shown, use the list only as a guide and order by description.
3. Give the part number, description and quantity needed of each item. If an old part cannot be identified return the part prepaid to your dealer or nearest AUTHORIZED SERVICE STATION. Print your name and address plainly on the package. Write a letter to the same address stating the reason for returning the part.
4. State definite shipping instructions.

Any claim for loss or damage to your unit in transit should be filed promptly against the transportation company making the delivery. Shipments are complete unless the packing list indicates items are back ordered.

"Prices are purposely omitted from this Parts Catalog due to the confusion resulting from fluctuating costs, import duties, sales taxes, exchange rates, etc.

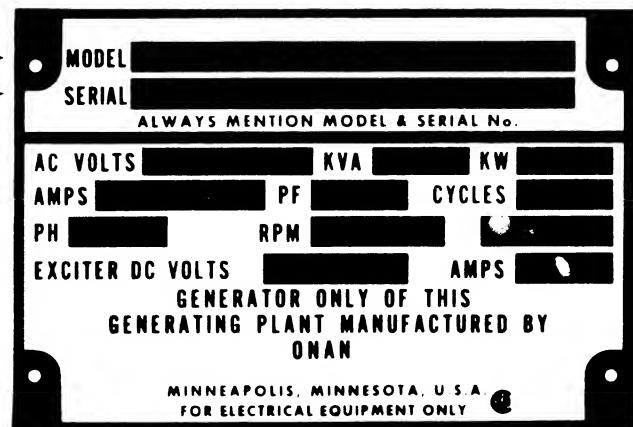
For Current parts prices, consult your Onan Dealer, Distributor or Parts and Service Center.

"En esta lista de partes los precios se omiten de propósito, ya que bastante confusión resultó de fluctuaciones de los precios, derechos aduanales, impuestos de venta, cambios extranjeros etc.

Consiga los precios vigentes de su distribuidor de productos ONAN".

To avoid errors or delay in filling your parts order, please furnish all information requested.

Always give the MODEL & SPEC. NO. and SERIAL NO.



PARTS LIST

GENERATOR PARTS

NOTE: For explanation of "Parts Key No." refer to "Table of Ratings" on page number 2 of this book.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	518-0012	1	Ring, Retaining - External - Drive End Bearing to Shaft	21	234-0047	1	Cover, End Bell
2	518-0166	2	Ring, Retaining - Internal - Drive End Bearing to End Bell	22	234-0065	1	Band, End Bell
3	510-0052	1	Bearing, Armature - Drive End	23	330-0006	1	Cover, Junction Box
4	211-0127	1	Bell, End - Drive End	24	330-0047	1	Box, Junction
6	234-0077	1	Scroll and Screen, Blower Stud, Generator Through	25			Brush, Commutator
7			520-0337 For models with Parts Key No. 1	214-0055	4		For models with Parts Key No. 1
			520-0486 For models with Parts Key No. 2	214-0065	4		For models with Parts Key No. 2
			520-0161 For models with Parts Key No. 3	214-0066	4		For models with Parts Key No. 3
8	205-0060	1	Blower, Air	26		2	Condenser
9	515-0045	1	Key, Armature Shaft Drive	312-0017	2		.5 Mfd. - For models with Parts Key No. 1
10			Armature Wound Assembly	312-0038	2		.5 Mfd. - For models with Parts Key No. 2
	201-957	1	For models with Parts Key No. 1	27	212-1003	4	Spring, Commutator Brush
	201-1070	1	For models with Parts Key No. 2	28	212-1105	4	For models with Parts Key No. 1
	201-0958	1	For models with Parts Key No. 3	29	212-1214	4	Spring, Commutator Brush
11			Shoe, Pole - Field				For models with Parts Key No. 2 and 3
	221-0056	4	For models with Parts Key No. 1				Clamp, Brush Rig
	221-0130	4	For models with Parts Key No. 2				For models with Parts Key No. 1, Parts Key No. 2 - Spec B and Parts Key No. 3
	221-0128	4	For models with Parts Key No. 3				
12			Interpole, Commutating				
	221-0047	2	For models with Parts Key No. 1				
	221-0133	2	For models with Parts Key No. 2				
	221-0123	2	For models with Parts Key No. 3				
13	510-0047	1	Bearing, Armature - Brush Rig End				
14	232-0596	1	Clip, Bearing				
15			Coil Set, Field				
	222-1447	1	For models with Parts Key No. 1				
	222-1571	1	For models with Parts Key No. 2, Spec A				
	222-1595	1	For models with Parts Key No. 2, Spec B				
	222-1527	1	For models with Parts Key No. 3				
16			Coil Set, Commutating				
	222-1448	1	For models with Parts Key No. 1				
	222-1615	1	For models with Parts Key No. 2				
	222-1510	1	For models with Parts Key No. 3				
17			Frame, Generator				
	210-1665	1	For models with Parts Key No. 1				
	210-1682	1	For models with Parts Key No. 2, Spec A				
	210-1768	1	For models with Parts Key No. 2, Spec B				
	210-1640	1	For models with Parts Key No. 3				
18	403-0671	1	Bolt, Eye - Lifting - For models with Parts Key No. 2, Spec A	305-0133	1		Regulator Assembly, Voltage - Complete - Includes following parts:
	403-0095	1	For Models with Parts Key No. 2, Spec B, Parts Key No. 1 and Parts Key No. 3	305-0089	1		Bracket, Voltage Regulator Mounting
				305-0068	1		Cover, Voltage Regulator
				305-0132	1		Base Assembly, Regulator
				303-0065	1		Rheostat - 250 Ohm
				303-0032	1		Knob, Rheostat
19			Rig Assembly, Brush - Includes Brushes and Springs	305-0130	1		Plug-In Unit, Regulator
	212-0250	1	For models with Parts Key No. 1				
	212-0237	1	For models with Parts Key No. 2				
	212-0243	1	For models with Parts Key No. 3				
20	211-0097	1	Bell, End - Brush Rig End				

NOTE: If your generator nameplate carries a different model or Spec No. than listed in this manual, order replacement parts by description only, not by the part numbers given in the Parts List. Always be sure to furnish the Model, Spec and Serial No. of the generator as given on its nameplate.

CONTROLS FOR GENERATOR MODEL 2UF-125N/29A

CAUTION: Check regulator nameplate. If other than ONAN manufacture, these parts do not apply.

PART NO.	QTY. USED	PART DESCRIPTION
305-0133	1	Regulator Assembly, Voltage - Complete - Includes following parts:
305-0089	1	Bracket, Voltage Regulator Mounting
305-0068	1	Cover, Voltage Regulator
305-0132	1	Base Assembly, Regulator
303-0065	1	Rheostat - 250 Ohm
303-0032	1	Knob, Rheostat
305-0130	1	Plug-In Unit, Regulator

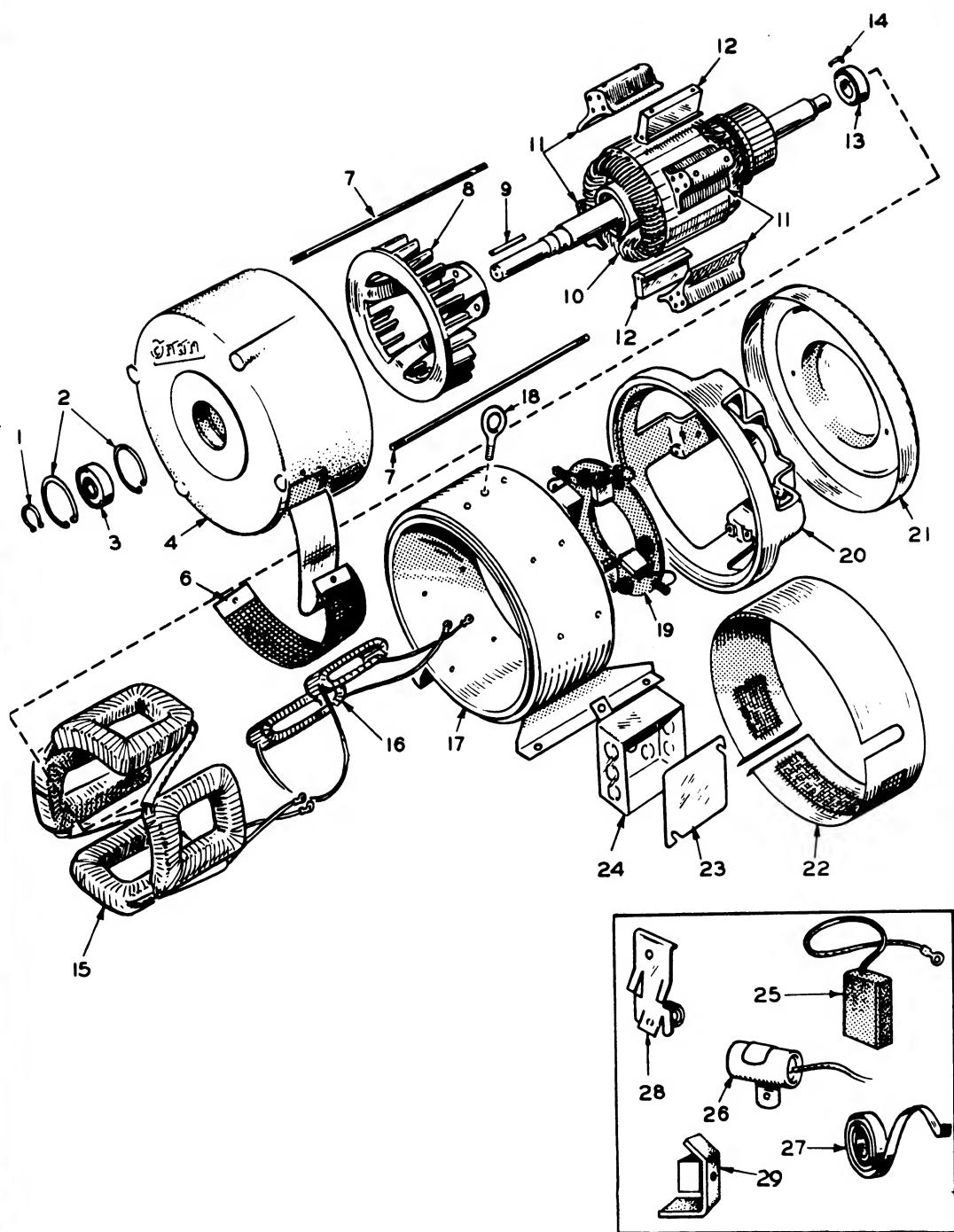


FIGURE 11. GENERATOR PARTS ILLUSTRATION



Onan

Onan Corporation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
Telex: 275477
Fax: 612-574-8087

Onan is a registered trademark of Onan Corporation
Cummins is a registered trademark of Cummins Engine Company